WHAT IS CLAIMED IS:

1. A coarse frequency synchronization apparatus in a frequency synchronizer of an orthogonal frequency division multiplexing (OFDM) receiver, the apparatus comprising:

a buffer operable to receive a demodulated symbol and output a shifted symbol generated by cyclically shifting the demodulated symbol by a predetermined shift amount;

a controller operable to determine a length of summation interval according to a phase coherence bandwidth and a number of sub-bands into which the summation interval is divided, and generate and adjust a symbol time offset according to the number of sub-bands;

a reference symbol predistortion portion operable to generate a reference symbol whose phase is distorted by the symbol time offset;

a counter operable to determine the shift amount;

a partial correlation portion operable to receive the shifted symbol and the reference symbol and calculate a partial correlation value for each of the sub-bands; and

a maximum value detector operable to calculate the shift amount where the sum of the partial correlation values is a maximum and output the shift amount as an estimated coarse frequency offset value.

2. The apparatus of claim 1, wherein the partial correlation portion is operable to calculate the partial correlation value for each sub-band using the equation $\sum_{m=0}^{K-1}\left|\sum_{k=m(N/K)}^{(m+1)(N/K)-1} X(((k+d))_N)Z^*(k)\right|$ where X(k+d) represents the shifted

demodulated symbol, Z(k) represents the reference symbol, N is a number of subcarriers, K is the number od sub-bands and d is the predetermined shift amount and is a value between $-\frac{2}{N}$ and $\frac{2}{N}$.

3. The apparatus of claim 1, wherein the reference symbol predistortion portion comprises:

a reference symbol generator operable to generate a phase reference symbol; and

a phase rotation portion operable to rotate the phase of the phase reference symbol according to the symbol time offset value and output a phase-distorted reference symbol.

4. The apparatus of claim 3, wherein the phase rotation portion is operable to generate a complex number corresponding to each of a plurality of subcarriers, by which a phase is rotated, multiply the generated complex number by the phase reference symbol, and generate a phase-distorted reference symbol.

5. The apparatus of claim 1, wherein the number of sub-bands is set to be less than $2 \times T_{off}$ where T_{off} is a maximum time offset for which frame synchronization can be achieved.

6. A coarse frequency synchronization method for use in an orthogonal frequency division multiplexing (OFDM) receiver for performing OFDM demodulation and frequency synchronization, the method comprising:

(a) receiving a demodulated symbol and outputting a shifted symbol generated by cyclically shifting the symbol by a predetermined shift amount;

(b) determining the length of a summation interval according to a phase coherence bandwidth and a number of sub-bands into which the summation interval is divided, and generating a predetermined symbol time offset according to the number of sub-bands;

(c) generating a reference symbol whose phase is distorted by the symbol time offset;

(d) counting the shift amount;

(e) calculating a partial correlation value between the shifted symbol and the reference symbol for each of the sub-bands; and

(f) determining the shift amount d where the partial correlation value is a maximum and outputting the shift amount d as an estimated coarse frequency offset value.

7. The method of claim 6, where in step (e), the partial correlation value is calculated for each sub-band using the equation

$$\sum_{m=0}^{K-1}\left|\sum_{k=m(N/K)}^{(m+1)(N/K)-1} X(((k+d))_N)Z^*(k)\right|$$ where X(k+d) represents the shifted demodulated symbol, Z(k) represents the reference symbol, N is a number of subcarriers, K is the number of sub-bands and the predetermined shift amount d is a value between $-\frac{2}{N}$ and $\frac{2}{N}$.

8. The method of claim 6, wherein in step (c) comprises the steps of:

(c1) generating a phase reference symbol; and

(c2) rotating the phase of the phase reference symbol according to the symbol time offset value and outputting a phase-distorted reference symbol.

9. The method of claim 8, wherein in step (c2), a complex number corresponding to each of a plurality of subcarriers, by which a phase is rotated, is generated, and the generated complex number is multiplied by the phase reference symbol to generate a phase-distorted reference symbol.

10. The method of claim 6, wherein the number of sub-bands is set to be less than $2 \times T_{off}$ where T_{off} is a maximum time offset for which frame synchronization can be achieved.

11. An orthogonal frequency division multiplexing (OFDM) receiver including a coarse frequency synchronization apparatus, the apparatus comprising:

a buffer that receives a demodulated symbol and outputs a shifted symbol generated by cyclically shifting the symbol by a predetermined shift amount ;

a controller than determines the length of a summation interval according to a phase coherence bandwidth and a number of sub-bands into which the summation interval is divided, and generates and adjusts a symbol time offset according to the number of sub-bands;

a reference symbol predistortion portion that generates a reference symbol whose phase is distorted by the symbol time offset;

a counter that counts the shift amount;

a partial correlation portion that receives the shifted symbol and the reference

symbol and calculates a partial correlation value for each of the sub-bands; and

a maximum value detector that calculates the shift amount d where the partial correlation value is a maximum and outputs the shift amount d as an estimated coarse frequency offset value.

12. The receiver of claim 11, wherein the partial correlation portion calculates the partial correlation value for each sub-band using the equation $\sum_{m=0}^{K-1}\left|\sum_{k=m(N/K)}^{(m+1)(N/K)-1} X(((k+d))_N)Z^*(k)\right|$ where X(k+d) represents the shifted demodulated symbol, Z(k) represents the reference symbol, N is a number of subcarriers, K is the number of sub-bands and the predetermined shift amount d is a value between $-\frac{2}{N}$ and $\frac{2}{N}$.

13. The receiver of claim 11, wherein the reference symbol predistortion portion comprises:

a reference symbol generator that generates a phase reference symbol; and

a phase rotation portion that rotates the phase of the phase reference symbol according to the symbol time offset value and outputs a phase-distorted reference symbol.

14. The receiver of claim 13, wherein the phase rotation portion generates a complex number corresponding to each of a plurality of subcarriers, by which a phase is rotated, multiplies the generated complex number by the phase reference symbol, and generates a phase-distorted reference symbol.

15. The receiver of claim 11, wherein the number of sub-bands is set to be less than $2 \times T_{off}$ where T_{off} is a maximum time offset for which frame synchronization can be achieved.